

U.S. Application Serial No. 09/800,851

Declaration dated July 14, 2004

Filed with Reply to Office Action of March 15, 2004

Attorney Docket No.: 10006513-1

PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: John F. Hutton et al.

Examiner: Albert C. WANG

Serial No.: 09/800,851

Art Unit: 2115

Filed: March 7, 2001

For: A SCAN BASED MULTIPLE RING OSCILLATOR STRUCTURE FOR
ON-CHIP SPEED MEASUREMENT**RECEIVED**

JUL 19 2004

Technology Center 2100

Commissioner for Patents

P.O. Box 1450

Alexandria, Virginia 22313-1450

DECLARATION OF JOHN F. HUTTON PURSUANT TO 37 C.F.R. § 1.131

Dear Sir:

1. Prior to December 28, 2000, the filing date of US Patent No. 6,535,013 to Samaan, I jointly conceived of at least a method for detecting process variations comprising controlling count gate control by a first circuit, generating at least one clock count by a second circuit, and outputting results of the clock count by a third circuit, as claimed in claims 1-9 of the present application.

2. Prior to December 28, 2000, I jointly conceived of at least an apparatus to detect process variations comprising a first circuit to select a clock, a second circuit connected to the first circuit to generate at least one clock count, and a third circuit connected to the first circuit to output a result of the clock count, as claimed in claims 10-20 of the present application.

3. On August 15, 2000, I jointly submitted an Invention Disclosure form to Hewlett-Packard's internal Legal Department (HP Legal). See Exhibit A. The Invention Disclosure form that I submitted included the brief description and diagrams associated with the invention. Such Invention Disclosure forms are submitted so that HP Legal can determine whether to file a patent application.

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4. From immediately prior to December 28, 2000 until the March 7, 2001, the effective filing date of the present application, the claimed invention was constructively reduced to practice with due diligence.

5. On December 28, 2000, I sent draft figures related to the claimed invention to Ami Shah, previously of Dorsey & Whitney LLP.

6. On or about February 4, 2001, I received a draft application describing the claimed invention from Ami Shah.

7. On or about February 6, 2001, I subsequently reviewed the draft application and provided comments to Ami Shah.

8. On or about February 8, 2001, I received a revised draft application describing the claimed invention from Ami Shah.

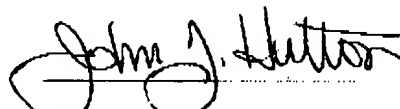
9. On or about February 21, 2001, I subsequently reviewed the revised draft application and provided comments and other feedback.

10. On March 7, 2001, the present application was filed.

11. The acts related above all took place in the United States of America.

12. The declarant further states that the above statements were made with the knowledge that willful false statements and the like are punishable by fine and/or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that any such willful false statement may jeopardize the validity of this application or any patent resulting therefrom.

Date: July 14, 2004



John F. Hutton

ALL-STATE LEGAL®

EXHIBIT

A



INVENTION DISCLOSURE

PDNO 10006513

DATE RCVD 8/15/00

PAGE ONE OF

ATTORNEY AJN VTC

Instructions: The information contained in this document is **COMPANY CONFIDENTIAL** and may not be disclosed to others without prior authorization. Submit this disclosure to the HP Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.

Descriptive Title of Invention:

Scan based multiple ring oscillator structure for on-chip speed measurement and correlation

Name of Project:

Piranha (PCXX? 8600?)

Product Name or Number:

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):

NO

Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s):

NO

Was the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, the date(s) and name(s):

NO

If any of the above situations will occur within 3 months, call your IP attorney or the Legal Department now at: 1-855-4513 or 570-692-4919

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.)

Yes - John Hutton's lab book

Was the invention built or tested? If so, the date:

Yes - on current release of Piranha

Was this invention made under a government contract? If so, the agency and contract number:

NO

Description of Invention: Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).

- A. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).

SEE ATTACHMENT!

B. Problems solved by the invention.

Attachment

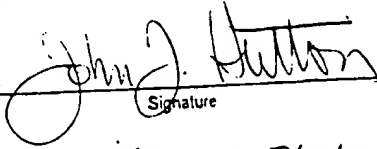
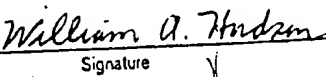
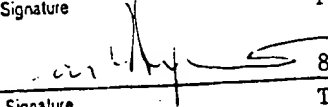
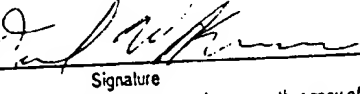
C. Advantages of the invention over what has been done before.

Attachment

D. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)

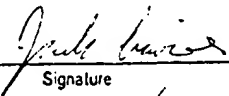
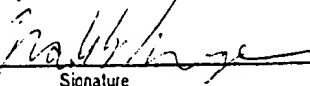
Attachment

Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on:

243148	John F. Hutton		898-4497	88	VTC
Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
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315502	Daniel L. Halperin		898-3273	88	VTC
Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
311897	Daniel W. Krueger		898-2236	88	VTC
Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name

(If more than four inventors, include additional information on another copy of this form and attach to this document.)

Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on:

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Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name

(If more than four inventors, include additional information on another copy of this form and attach to this document)



INVENTION DISCLOSURE

COMPANY CONFIDENTIAL

PAGE ____ OF ____

Signature of Witness(es): (Please try to obtain the signature of the person(s) to whom invention was first disclosed.)
The invention was first explained to, and understood by, me (us) on this date: |

Full Name

J. Robert Sims, Jr.

Signature

J. Robert Sims, Jr.

Date of Signature

15 Mar 2001

Date of Signature

Full Name

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INVENTION DISCLOSURE

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PAGE ____ OF ____

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The invention was first explained to, and understood by, me (us) on this date: _____

Date of Signature

Full Name

Signature

Date of Signature

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City

Citizenship

Greeted as (nickname, middle name, etc.)

ring_cntl1

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on 02/03/00 03:24:40 PM MST

RING_CNTL

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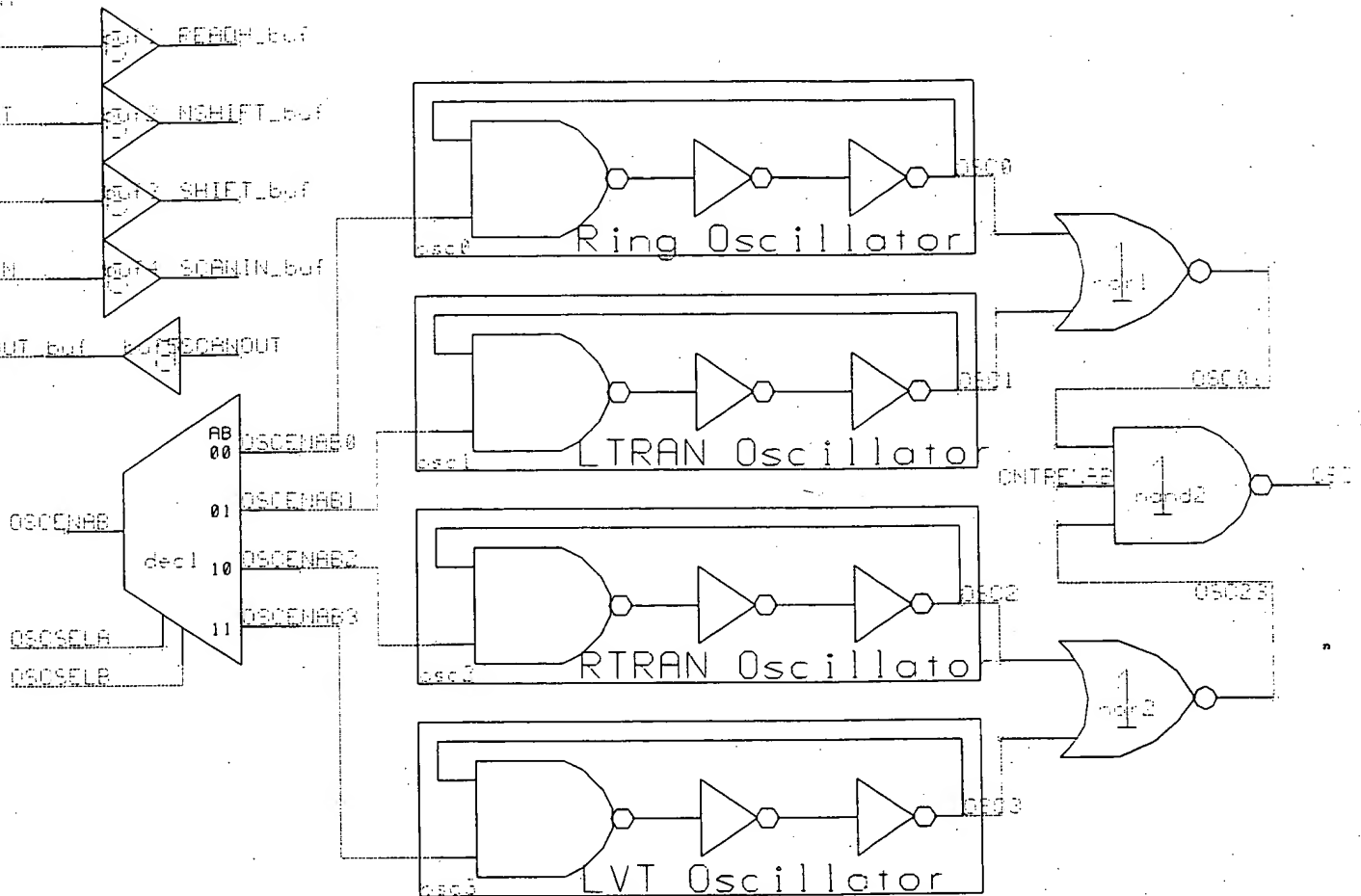
RING_CNTL = SCANINSCANOUTCNTL
RING_CNTL = SCANOUTLAST=SCANOUTCNTL
RING_CNTL = WRITEH IN=WRITEH
RING_CNTL = SHIFT=SHIFT_buf
RING_CNTL = NSHIFT=NSHIFT_buf

```

VDD
GND

POWERUP
POWERLONC
WRITEH
READH

NSHIFT
SHIFT
SCANIN
SCANOUT_buf



ring_counter1

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RING_COUNTER

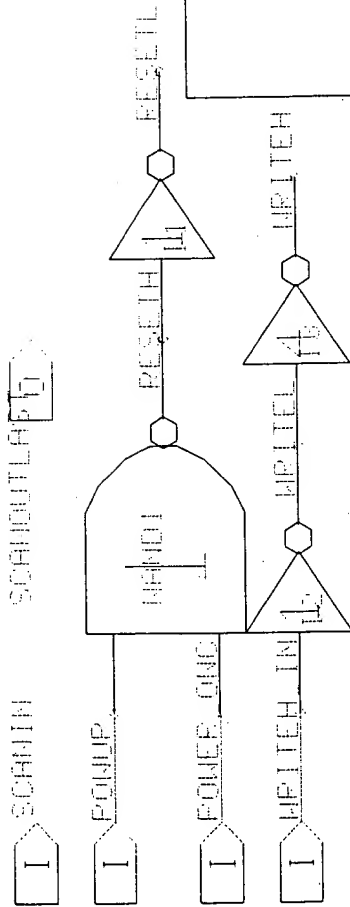
```

RING_COUNTER = SCANINSCANOUTCNTL
RING_COUNTER = SCANOUTLAST=SCANOUT
RING_COUNTER = IN=OSC
RING_COUNTER = UPDATER=READH_buf
RING_COUNTER = RESETH=OUTRESETH
RING_COUNTER = RESETL=OUTRESETL
RING_COUNTER = SHIFT=SHIFT_buf
RING_COUNTER = NSHIFT=NSHIFT_buf

```

Scan Ports
Block Ports

ring_block2



VDD
GND

scanlat[0:3]

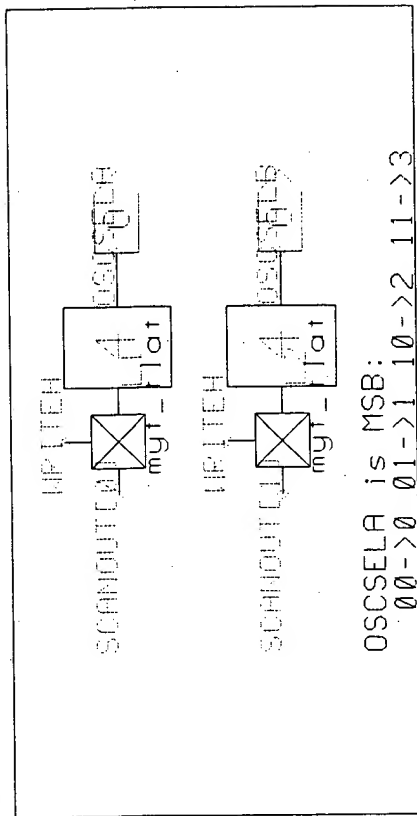
sc r o s 1 1

CONTROL LATCHES ARE:
0-1 = mux select
2 = reset counter
3 = enable osc

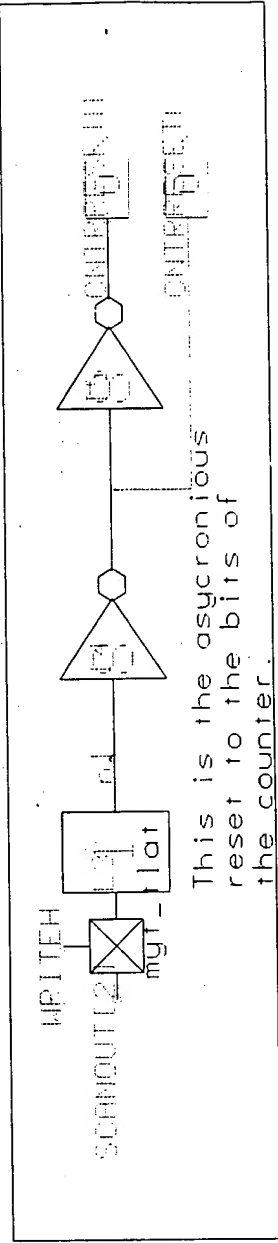
INA GND
NSHIFT NSHIFT I
SCANIN
SHIFT SHIFT I
UPDATEA GND
SCANOUT

1 scanlat = SCANIN, SCANOUT[0:2]
1 scanlat = SCANOUT = SCANOUT[0:2], SCANOUTLAST

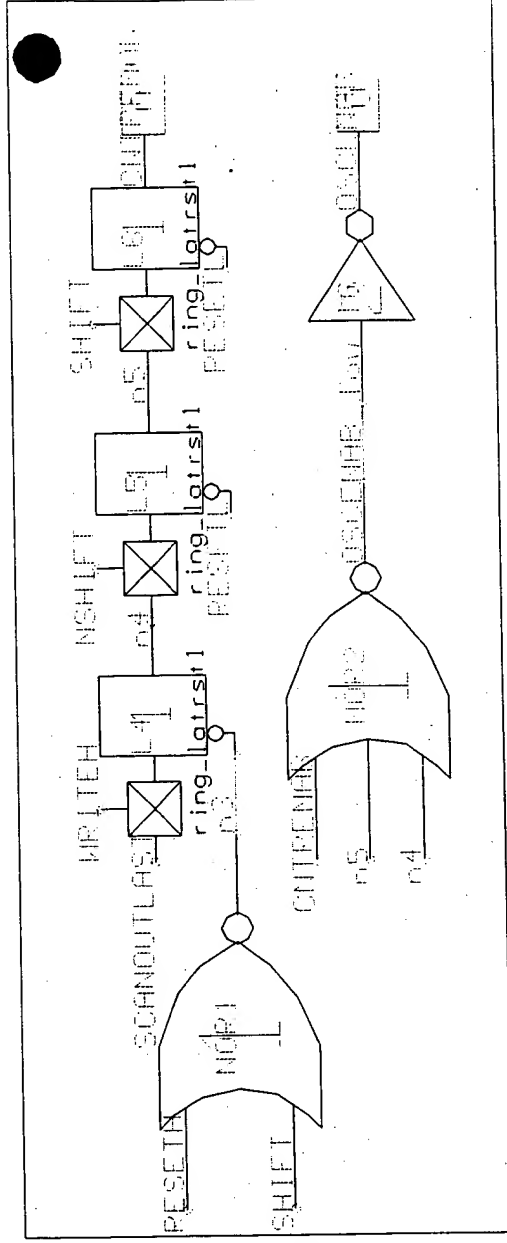
ring_cnt 11



OSCSELA is MSB:
00->0 01->1 10->2 11->3

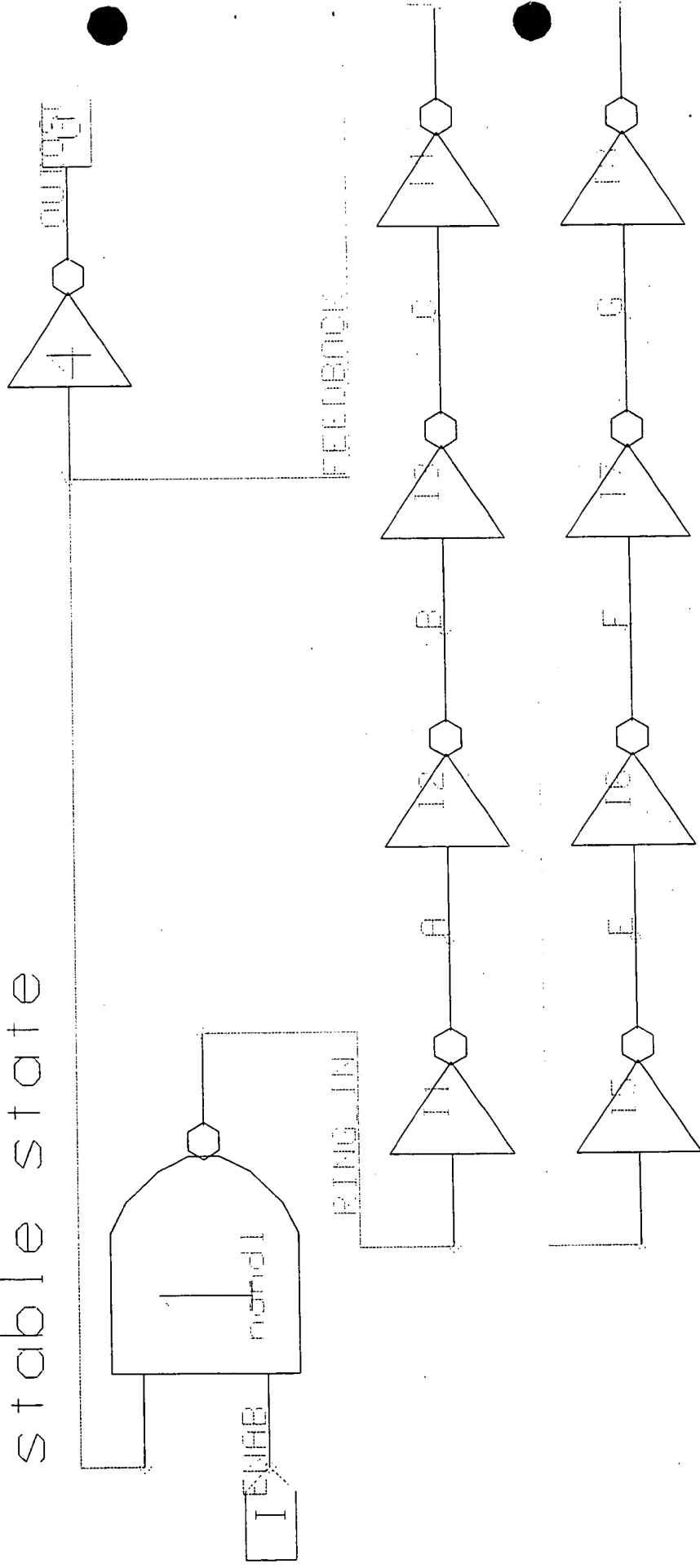


This is the asynchronous reset to the bits of the counter.

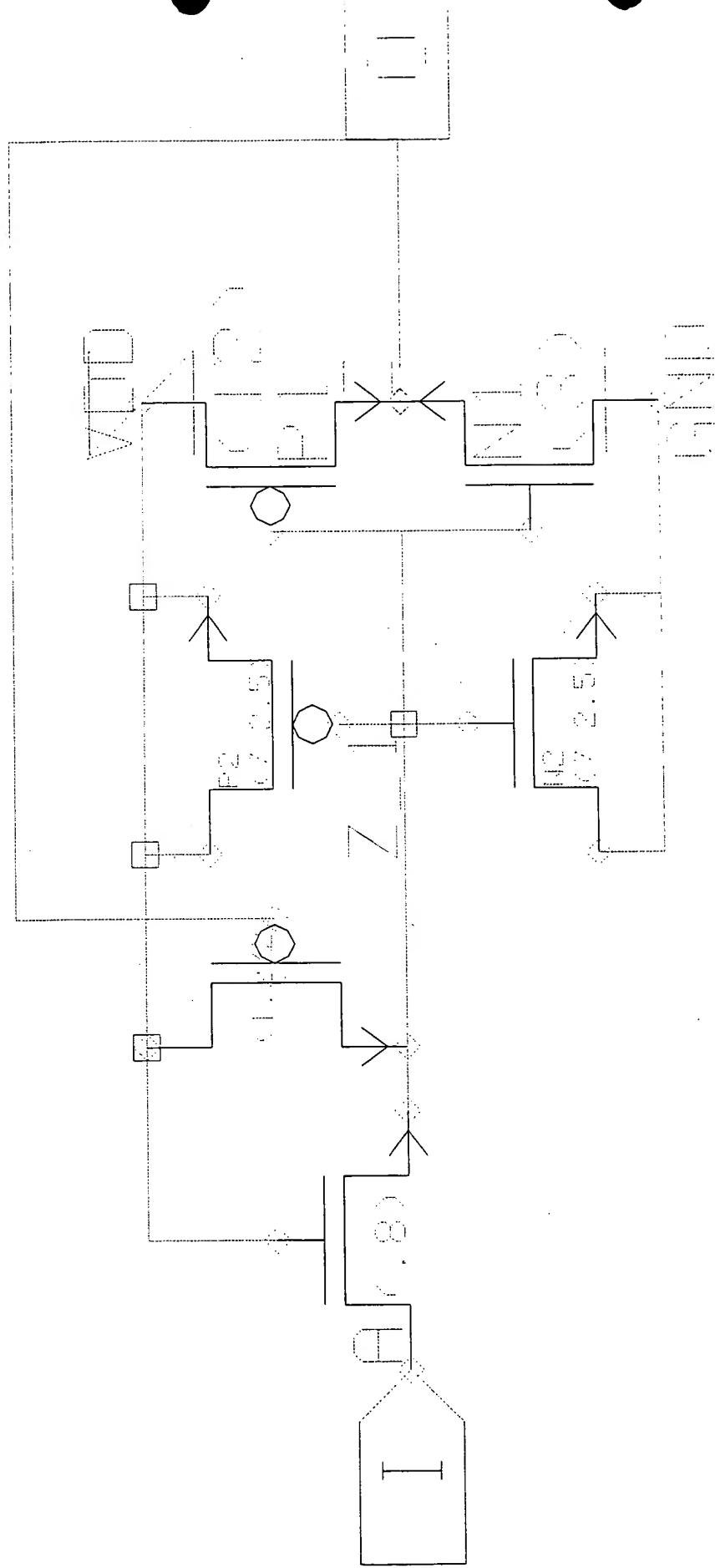


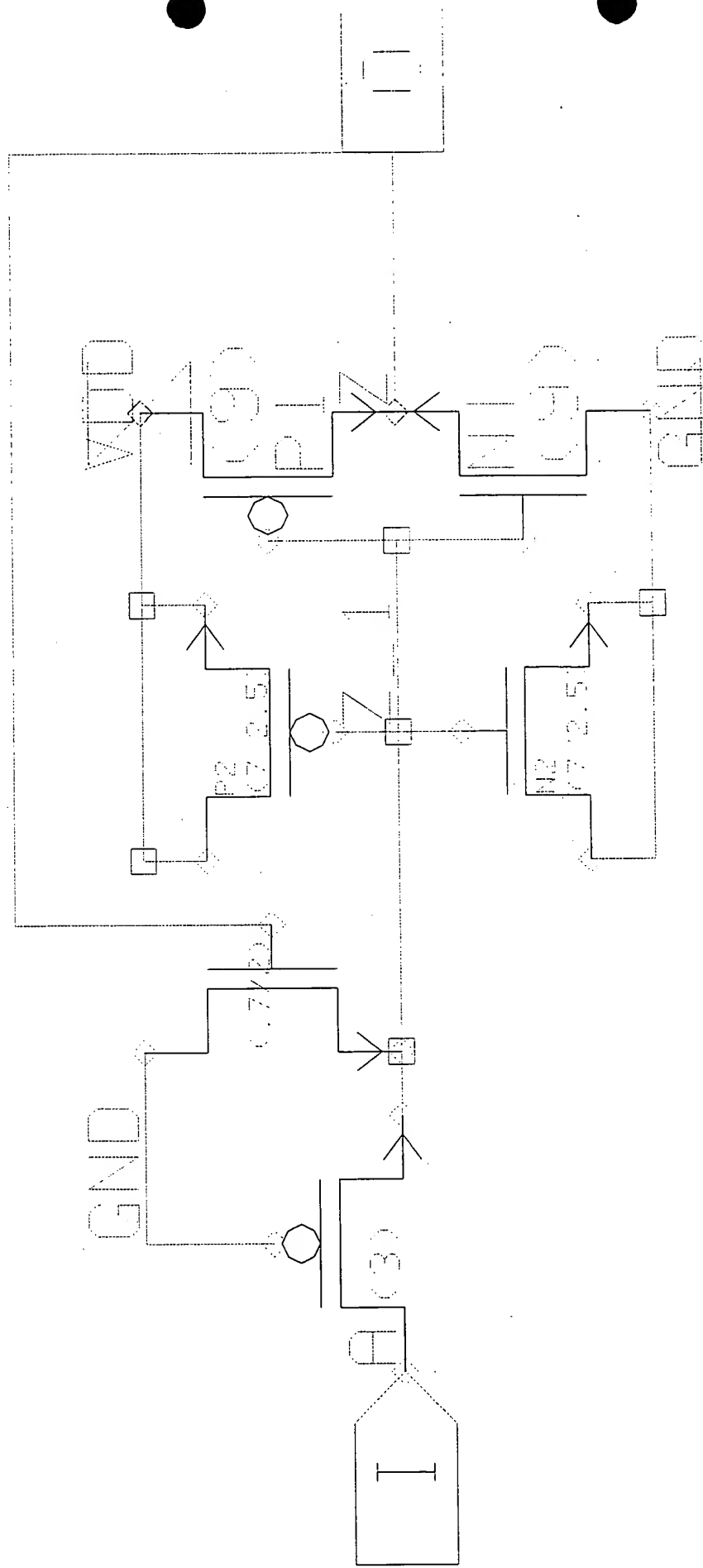
VDD GND

When ENAB is held low the ring will reset to a stable state

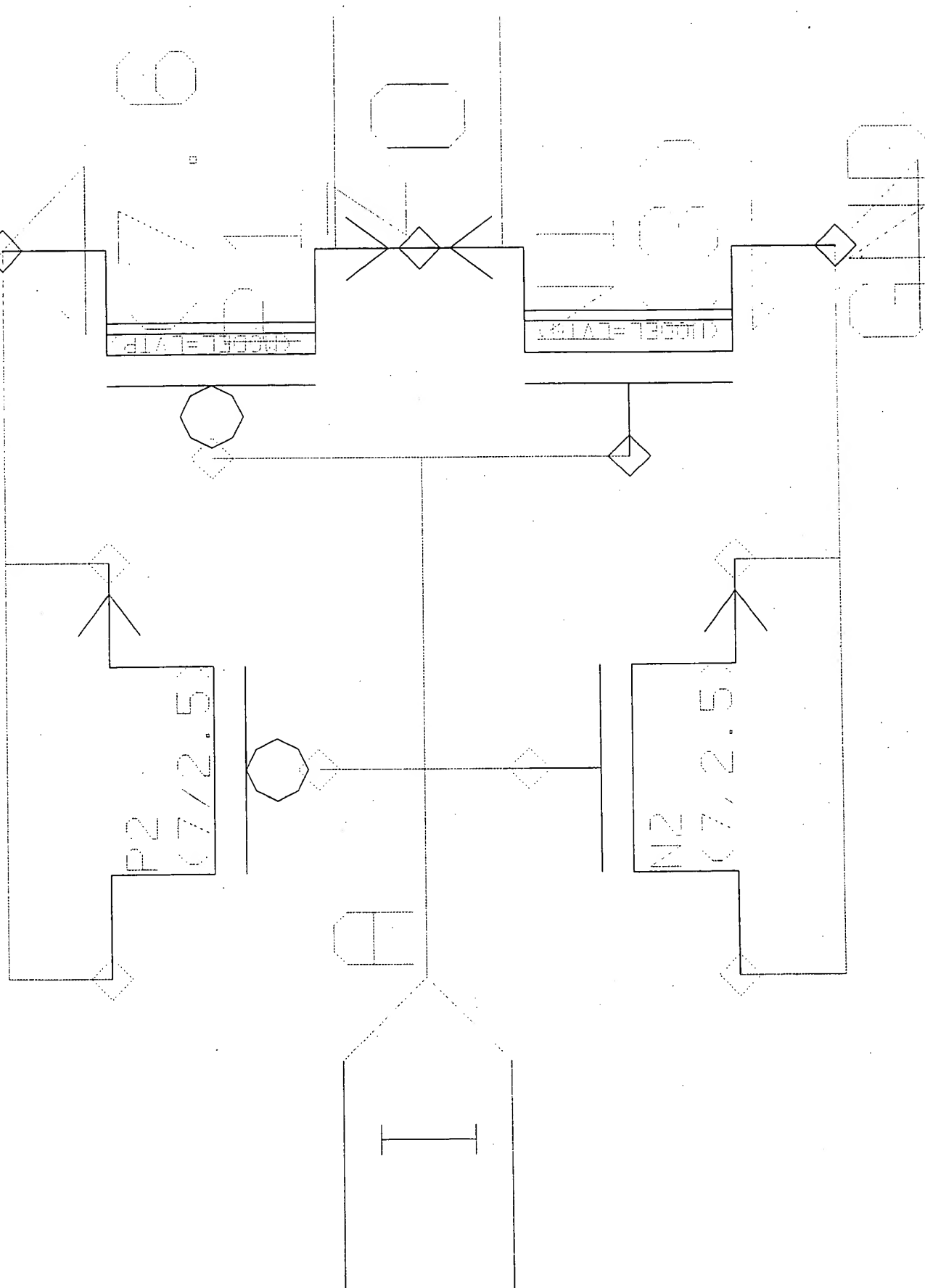


ring_osc1





ring_invrtran1



ring_invl_vt1

Aug 1 2000

Normal oscillator, 8 stages, 800 MHz nominal frequency

LTran oscillator, added an N-fet pass transistor, 200 MHz nominal
RTran oscillator, added an P-fet pass transistor, 200 MHz nominal
Low Vt oscillator, the normal with Low Vt fets.

The L- and R-tran structure, at least in spice, had stronger dependences on the handedness of the process. We hope that this would allow us to keep better track of major process variations.

The counter was a simple 20-bit ripple counter with an asynchronous reset. It was composed of T-flip flops. While the ripple time was on the order of milliseconds, the scan control had no way of operating that fast. The danger of having an error related to ripple is almost non-existent.

The control is the heart of the structure. Since this circuit is entirely scan driven, we have to be able to reset, select one of the four oscillators, control the start and stop of the count, latch and scan out the final count. The 'start and stop' is the most critical segment of this block.

Two control bits select the oscillator. One control bit triggers a reset of the counter. The final bit is the enable line.

In order to accurately control the time that the counter is on, we set up a simple state machine that looks for two successive SHIFT-rising on the scan clock. This is a signal that the tester can control with a very high precision. The input scan vector disables the reset, selects the oscillator, and enables the count. On the next SHIFT clock, the counter is gated on. On the subsequent SHIFT clock, the counter is gated off. Then the count can be transferred back to the scan chain and shifted out.